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Dear reader,

whenever people ask me what I do in my job, I reply, “well, I’m working for an innovation agency”. Then they go “aha”. Pause. After a few seconds they ask, “And what do you exactly do in this business?”. Good question. Innovation is diverse and different from day to day depending on what and who you are dealing with.

In order to bring in more transparency, we started to conduct interviews with those we meet on the road to innovation. We talk to customers, partners, and everyone else who is willing to speak about the opportunities, risks, and the challenges of innovation.

Our goal is to anchor innovation in people's minds as an enrichment of corporate culture. We are working for a welcoming culture for new ideas on all levels of society. If you would like to tell your innovation story, feel free to contact us via E-Mail at: kontakt [at] innoXperts.com. We are looking forward to your story.

Thanks for your time and have fun reading this interview,

Gesine Cody, innoXperts® team

mobOx: a groundbreaking life-saving device for emergency medical services

An interview with the inventors, developers and founders M.Sc. Benjamin Kern and Prof. Dr.-Ing. Stefan Müller

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The mobOx team (from left to right):

Till Böhme (B.Sc. - Industrial Engineer. Business Development),

Benjamin Kern (M.Sc. - Medical Technology. Algorithms and Optics),

Stefan Müller (Prof. Dr.-Ing.Electrical Engineering. Development),

Reza Behroozian (M.Sc. - Medical Technology. Electronics, Measurement Technology and Sensor Technology)

Groundbreaking life-saving device in medical engineering

mobOx is a groundbreaking innovation from Lübeck, Germany. The mobile blood analyzer is a world novelty because it combines properties that have not previously existed in this combination.

Mobile, robust, digital

mobOx is characterized by an innovative combination of spectrometer, AI-based algorithms and robustness. The device is significantly less sensitive to fluctuations in the ambient temperature and mechanical vibrations. In addition, it is significantly smaller and lighter than comparable clinical devices. The devices that are currently in use in hospitals require ambient temperatures of 15 to 30 degrees and weigh up to 18 kg. In addition, mobOx can transmit blood analysis data digitally and directly from the ambulance to the hospital.

mobOx can save your life faster

The aim of the inventors is to promote the use of the device nationwide. A time-consuming process, since the equipment of the ambulance in Germany is a matter of the states. To make matters worse, emergency medical services in every federal state have to negotiate the equipment of their emergency vehicles individually with the respective health insurance companies.

mobOx for all rescue services

In May 2021, the mobOx team took first place in the Gateway49 Accelerator funding program and is currently holding talks with potential financing and sales partners as well as innovative rescue services. In the medium term, mobOx is also to be used in hospitals and by resident doctors. The prototype should be completed in the third quarter of 2021.

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06-19-2021 Update: "from Waterkant to Silicon Valley"

Schleswig-Holstein accelerates start-up success: the state government organizes the StartUp Camp in cooperation with actors from the economy. The mobOx team pitches successfully and takes third place. Congratulations!

„We took a lot of positive input from the great coaching and great pitches and are now looking forward to three months in the Plug and Play Accelerator in Silicon Valley.“ M.Sc. Benjamin Kern, mobOx developer and co-founder

1. Where does the name mobOx come from?

M. Sc. Benjamin Kern
mobOx is derived from mobile oximetry. We have capitalized the “O” to make it easier to pronounce mob··· Ox, but we also say mo··· Box from time to time. The association between device and box is also quite good. We also had ideas like “NotOx”, but that was too negatively associated with us in English and doesn't also work too well in German since „Notfall“ means „emergency“. So, we took a more positve approach by creating the name out of "mobile oximetry".

2. How does mobOx work?

M. Sc. Benjamin Kern
Similar to a blood glucose meter. The ambulance arrives at the scene and finds an inaccessible patient. mobOx is switched on, the test strip is inserted and blood is withdrawn via the guide wire of a venous access or with finger picks.

The test strip remains in the device until mobOx has read out the most important blood analysis values, such as the pH value, the oxygen saturation and the proportions of different forms of hemoglobin. The results are then transmitted digitally and directly from the ambulance to the medical staff in the nearest hospital.

In respiratory emergencies in Germany, an average of 38 minutes elapse between the arrival of the emergency medical services on-site and their arrival at the hospital. With mobOx, emergency doctors know the most important blood values before patients have arrived at the hospital. The early diagnosis shortens the way to the right therapy and helps to save lives.

3. Where did the idea for mobOx come from and who of you had it?

Prof. Dr.-Ing. Stefan Müller
Actually, mobOx is a "waste product". Six years ago, at a conference, I met one of the employees of the Eschweiler company in Kiel. The company builds classic laboratory equipment and asked us if we could develop an oximetry module that they could integrate into their equipment. Above all, the

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blood samples should do without any pretreatment. So far, the blood has usually been pretreated chemically or with ultrasound.

So we started with the aim of adding one or more parameters to a classic laboratory device that should function reliably in stationary use. Then Benjamin got involved in the project and wrote his doctoral thesis on it.

M. Sc. Benjamin Kern
It was my job to develop the sensor concept. So I dealt with the topics of machine learning and artificial intelligence (AI). After working on various algorithms, at some point we found that the sensor concept that we developed for our cooperation partner is extremely robust.

Robust in the sense of being insensitive to temperature fluctuations or mechanical vibrations. So we asked ourselves whether this could not be used in other areas as well.

Prof. Dr.-Ing. Stefan Müller
Then there was one more thing: The light source that we need to be able to take the measurement at all. A conventional light source would have been completely sufficient for a stationary device. By chance we came across a special white LED which has particularly advantageous properties for spectroscopic purposes. These enable an even smaller and cheaper implementation.

That was the point at which we said that the combination of sensor properties, algorithms, energy-saving LEDs, mini-spectrometers and the fact that the blood does not have to be pretreated has really never been done before.

Only this combination makes the development of a mobile handheld device possible in the first place. The idea is a team effort. We all pull together and are constantly exchanging ideas with one another.

M. Sc. Benjamin Kern
At the TH Lübeck we have a strong application focus. For me it was very important that my doctoral thesis describes something that is put to practical use and does not disappear in any drawer.

4. How important was innovation consulting for you?

M. Sc. Benjamin Kern
I would consider that to be crucial. After we had the idea, we applied for the Gateway49 accelerator program as one of around 60 teams from all over Europe. Incidentally, we also came up with the name mobOx for this occasion.

As engineers who come from university, we have a very good technical background. What we are missing is the construct around it that you need to successfully pull up a start-up. This includes business and legal aspects and, most importantly, market validation.

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You don't want to develop a product completely bypassing the user. Networking alone has helped us tremendously. Contacts in emergency medical services are very difficult to grasp. Having a partner by our side who arranges contacts to contact persons has brought us massively forward.

So the first thing we did was do some market research. We wanted to find out whether there was even a market for our idea. We were able to speak to many intensive care physicians and emergency doctors, who very much welcomed the idea of a mobile blood analysis device directly on site.

Prof. Dr.-Ing. Stefan Müller
In medical technology in particular, you have to reach the right people. We received around 14 contacts from a single mentor at Gateway49. Just the advance notice "a start-up will contact you" was a valuable door opener for us. The people have little time and have to be on duty in the middle of it all. The leap of faith made them much more willing to take the time to talk to us.

M. Sc. Benjamin Kern
When it comes to emergency medical services, we rely on external expertise, e.g. when it comes to the question of how many vehicles are in use by ambulance services. Regular coaching was particularly valuable in the Gateway49 program, which has run over a period of nine months.

We were able to discuss and evaluate the respective development status and progress with the mentors on a weekly basis and derive concrete measures from this, such as establishing contact with other mentors. It was like a Swiss Army knife made from the tools that we could use at the right time.

We have now made first place and have met a lot of good other teams. Actually everyone should have the opportunity to be coached in this way.

Prof. Dr.-Ing. Stefan Müller
The selection was based, among other things, on whether the product can successfully assert itself on the market. For me, the most valuable thing was that the product itself was considered critically and from other perspectives. Without the advice, we would probably have continued blindly in the technical line, built and then watched what happened.

M. Sc. Benjamin Kern
Usually developers identify a problem and provide a solution for it. For us it was the other way around. We had a solution and looked at the market to see if anyone could use our solution. We would never have come this far without innovation advice.

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5. Four men in first place. Where are the women?

M. Sc. Benjamin Kern
We would also like to have it differently and have tried it seriously. When we advertised the business administration position, we advertised massively for female positions. I am convinced that mixed teams are better. But women are also underrepresented in medical technology. Even if we write in a job advertisement "Applications from women are expressly welcome", unfortunately more women do not apply.

Prof. Dr.-Ing. Stefan Müller
At least we managed to win a student from the biomedical engineering course for our team. There are quite a few women represented there. A real stroke of luck. She has been supporting us in construction since April.

6. Which actions could be taken in order to reshape engineering into a more diverse and "gender-neutral" field of science?

M. Sc. Benjamin Kern
An excellent question that I've given a lot of thought to. I was a member of an appointment committee at the Technical University of Lübeck (THL). There is an equal opportunities officer there who asks applicants "How would you like to encourage us to get more women into medical-technical professions?"

Unfortunately, there is no simple answer to that. The causes are usually much earlier. Few women arrive in technical courses at universities. In that respect I would welcome a change very much. I consider a balanced team to be an asset to any company.

We would be very happy to see more female actors. Companies still consider family planning for women, but not for men.

Prof. Dr.-Ing. Stefan Müller
You would just have to start earlier, such as going to schools and trying to get girls interested in technical professions. After all, fifty percent of the management positions on our presidium at the university are held by women, and as a university we have been participating in Girls' s Day for years.

Before I was appointed professor at the TH Lübeck, as an employee of the Miltenyi Biotech company, I experienced for myself how much an in-house kindergarten relaxes the life of families and makes work more productive because the high organizational effort is eliminated.

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In schools we need teachers who are able to teach students how to enjoy the natural sciences. Equal pay is also an issue. In my circle of friends I have only one example where she earns more than he does.

7. What is it like to develop an innovative product in times of corona?

M. Sc. Benjamin Kern
We were not allowed to work for a while and felt restricted. In some cases, some components were not available. On the whole, however, we have not been slowed down very much. I would have liked live events during this phase. Live you interact differently with each other than in video calls. Unfortunately, we didn't pitch once live [Note: Pitch = short presentation of a business idea. Often in competition with others.]

Prof. Dr.-Ing. Stefan Müller
On the one hand, the Corona conditions have accelerated parts of our work very much, on the other hand, live dates have broken down. Nevertheless, we were lucky because we were just in the development phase and Benjamin made much faster progress with the algorithm development. If we had had to rely on patient studies during this phase, we would have had bigger problems.

8. How do you protect mobOx against product piracy?

Prof. Dr.-Ing. Stefan Müller
We are currently applying for a patent that protects the measurement technology in combination with the algorithms. We now have a complex database in which the algorithms are trained. As an additional safeguard, we will provide the test strips with a QR code. We want to avoid that these are copied.

M. Sc. Benjamin Kern
In addition, the QR code ensures our quality standard and enables the blood analysis to be traced. We want to and will prevent the risk of false results from copied poorer test strips.

9. Isn't Germany too expensive as a production location?

Prof. Dr.-Ing. Stefan Müller
We plan to buy some components, such as the spectrometer. We have a German manufacturer at the start for this. Of course, where the individual components are produced is not entirely up to us. Safety and quality standards are also important. It will be possible to produce the test strip automatically. This can also be done in Germany at a reasonable price.

M. Sc. Benjamin Kern
We prefer local manufacturers in the area where you can go and have a look at the device. All partners we are currently working with are based in Northern Germany, North Rhine-Westphalia and Austria.

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10. If mobOx is successful, will you sell to the highest bidder?

M. Sc. Benjamin Kern
We intend to keep mobOx in hand and thus also in Germany.

Prof. Dr.-Ing. Stefan Müller
We are therefore looking for financing options where we can remain "master of the house". We currently have a partnership agreement and will also regulate our position in the planned GmbH contractually. There are never any guarantees, but we agree on that.

11. What is the next step for mobOx?

M. Sc. Benjamin Kern
We are working flat out on the completion of the device and on further financing. Once the financing is in place, we can concentrate fully on the device again. We aim to complete the prototype in the third quarter of 2021. Clinical studies then follow. The market entry should take place at the end of 2022, beginning of 2023. If the step of further financing is successful, we can immediately invest one hundred percent of our time and energy in mobOx. The expansion strategy is in place.

Prof. Dr.-Ing. Stefan Müller
As a distributor of a medical product, we have looked for an external partner in Lübeck with whom we will establish a quality management system in accordance with DIN EN ISO 13485. We also already have a partner for CE marking. Clinical partners will also support us with their expertise. We have already identified all of our partners and no longer need to search for them.

M. Sc. Benjamin Kern
We are still open to exchange. Here on the campus of the TH Lübeck we can cooperate with everyone who works here. For example, we have an expert on the regulatory requirements for medical devices or product liability as a direct contact on site.

12. What are your top 3 learnings in terms of innovation so far?

Prof. Dr.-Ing. Stefan Müller
Number one to me is market observation. Take a close look at what you want to develop your product for. Talk to the people who will be using it. Then you will get exactly the right answers about what the whole thing should look like.

And a clever division of tasks in the team that corresponds to the strengths of the respective personality.

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M. Sc. Benjamin Kern
You should definitely talk about expectations and think about efficient structures. Exchange with other founders and start-ups is incredibly important, as is networking with mentors and coaches. The feedback motivated us to keep going, and was also our compass and navigation system.

Good luck for the future and thank you for your time.

Interview conducted by Gesine Cody (innoXperts® Strategy, Communication & Senior Copy Writer)

Further information:

https://mob-ox.de/en/home-2/